

## **Tropical Surface Temperatures, Lightning and the Global Electric Circuit**

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Approximately 75% of the earth's lightning activity occurs within the tropics ( $\pm 30^\circ$  latitude). Although the majority of lightning is concentrated over the tropical land masses, a strong coupling exists between tropical surface temperatures and the frequency of lightning activity in tropical thunderstorms. Thunderstorms are coupled to the upper atmosphere through the global electric circuit. The currents flowing in the global electric circuit are generated in the lower troposphere by lightning, point discharge and other processes associated with thunderstorm activity. These currents pass through the stratosphere and mesosphere, before reaching the ionosphere, and return to the earth in regions of fair weather conditions. The globally integrated currents result in an ionospheric potential that fluctuates around 250 kV. It will be shown that there exists an indirect non-linear coupling between tropical surface temperatures and the ionospheric potential. Since the global electric circuit can be monitored theoretically from a single location, it may be possible to use the global electric circuit to monitor future fluctuations in global lightning frequencies, and perhaps tropical surface temperatures. This would be of great importance in monitoring any future climate change that may occur.

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